

JOHN INNES HORTICULTURAL INSTITUTION

Bayfordbury, Hertford, Herts.

10th July, 1951.

Dear Dr. Lederberg,

Thank you very much for your interesting letter and for your interesting explanation of the "temporary" mutations. I am sorry that the Annual Report, of necessity, gave such an inadequate account. But a description and discussion of the data should have appeared in "Heredity" by now.

In answer to your question about the relative actions on the pollen phenotype of the generative and vegetative nuclei, I agree that it seems probable that the vegetative nucleus plays the major role but I know of no real evidence for this. The work of Newcombe (J. of Genet 1942) and my own unpublished work show that most of the pollen physiology is laid down before the division into the vegetative and generative nuclei. Furthermore, incompatibility seems to be laid down even earlier; mutations from X-rays given just after tetrad formation, which must be presumed to occur, have no effect on the immediate pollen phenotype. Despite this your explanation would still hold if the gene were behaving towards X-rays as if it were reproduced at this early stage ready for pollen grain division.

But I have six families of plants derived from X-rays which contain more than three plants, and these could not have arisen by a mutation in the vegetative nucleus alone.

An alternative to the "temporary" mutation explanation, as I see it, is that a change might have occurred in a possible cytoplasmic factor that is necessary for S gene expression. Such a hypothetical factor would have to be common to all the alleles otherwise if there were different factors specific to each S allele one would expect, due to irregular segregation of the cytoplasm at meiosis, the whole system to breakdown.

With such a common cytoplasmic factor, both of the S alleles of the diploid should pass the sieve and this would result in families with both S homogygotes.

As yet none have been found but the numbers are small and further tests, which are in progress, are necessary before ~~this~~ occurrence can be excluded.

Realizing that the "temporary" mutations would cut right across some of the orthodox concepts, I am cautious about it until further data are obtained.

Yours sincerely,

D. Lewis